

Notice of Allowability

Application No.

10/673,837

Examiner

CHUCK O. KENDALL

Applicant(s)

MITCHELL ET AL.

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- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 04/25/08.
2. ☒ The allowed claim(s) is/are 1-4,6-9, and 12 - 15.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date 01/10/05
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 07/31/08.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Examiners Amendment

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in an in person interview with Michael J. Buchenhormer registration no. 33,162 on July 31, 2008. Claims are being amended to clarify claim limitations.

The application has been amended as follows:

IN THE CLAIMS

2. Please amend Claim 1 and 14 and cancel claim 13.

Claim 1 (Currently amended)

A method comprising:

- a) receiving a plurality of samples of at least one object reference graph, wherein each object reference graph comprises live objects from a target application program, and their references;
- b) deriving a set of candidate data structures exhibiting a problematic data structure evolution, from the samples;
- c) collecting a plurality of properties of each of the live objects in each of the candidate data structures in relation to data structures over time; and
- d) using a mixture model, combining the plurality of the properties of each live object in a non-linear manner for ranking leak root candidates within each set of candidate data structures;

wherein using the mixture model comprises:

applying binary metrics to each of the candidate data structures for generating a set of potential leak root candidates, wherein leak roots comprise root objects of a leaking data structure, and wherein the binary metrics comprise attributes of: leaf nodes, arrays, internal nodes, non-owners, no age intersection, new arrays only, no fringe, and no data type intersection;

assigning a binary metric value to each candidate, wherein a value of zero indicates the candidate data structure is definitely not a leak root

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candidate and wherein a value of one indicates said candidate data structure is a highly probable leak root candidate; and

filtering out candidate data structures with any binary metric assigned a value of zero.

Claim 13 (Canceled)

Claim 14, (Currently amended)

The method of claim [[13]] 1 further comprising ordering each candidate in the set of potential leak root candidates, the ordering comprising:

determining a gated metric threshold value;

applying a weighted sum of a collection of gated metrics comprising gating functions of: on-stack ownership, on-stack reachability, ownership counts, new ownership, array ownership, fringe ownership, fringe datatype uniformity, datatype intersection, and dominance factor;

filtering out those candidates with gated metrics below the gated metric threshold value; and

assigning rank values to remaining candidates according to the gated metrics.

Reasons for Allowance

3. Examiner has reviewed Applicant's comments as indicated on pages 6 – 10 of his response of 04/25/08, and after further review of Applicant's arguments and current amendments to claims as indicated on Examiners amendment of as disclosed above, Examiner is hereby placing claims 1 – 4, 6 – 9, and 12 – 15 in condition for allowance.

The following is an Examiner's statement of reasons for allowance.

The prior art of record does not teach or fairly suggest at least:

"...using a mixture model, combining the plurality of the properties of each live object in a non-linear manner for ranking leak root candidates within each set of candidate data structures... applying binary metrics to each of the candidate data structures for generating a set of potential leak root candidates, wherein leak roots comprise root objects of a leaking data structure, and wherein the binary metrics comprise attributes of: leaf nodes, arrays, internal nodes, non-owners, no age intersection, new arrays only, no fringe, and no data type intersection;

assigning a binary metric value to each candidate, wherein a value of zero indicates the candidate data structure is definitely not a leak root candidate and wherein a value of one indicates said candidate data structure is a highly probable leak root candidate; and

filtering out candidate data structures with any binary metric assigned a value of zero", in such a manner as recited in claim 1, and as best illustrated by FIG. 2B.

Therefore, all remaining claims 1 – 5, 8 – 20, 76 – 81 and 84 are in condition for allowance.

4. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chuck Kendall whose telephone number is 571-272-3698. The examiner can normally be reached between Monday-Thursday at 11:30 – 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Dam can be reached on 571-272-3695. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Chuck O Kendall/

Primary Examiner, Art Unit 2192